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FIFTH ANNUAL REPORT OF THE DIRECTOR.

SUBMITTED TO THE TRUSTEES JAN. 10, 1894.

To the Board of Trustees of the Missouri Botanical Garden:

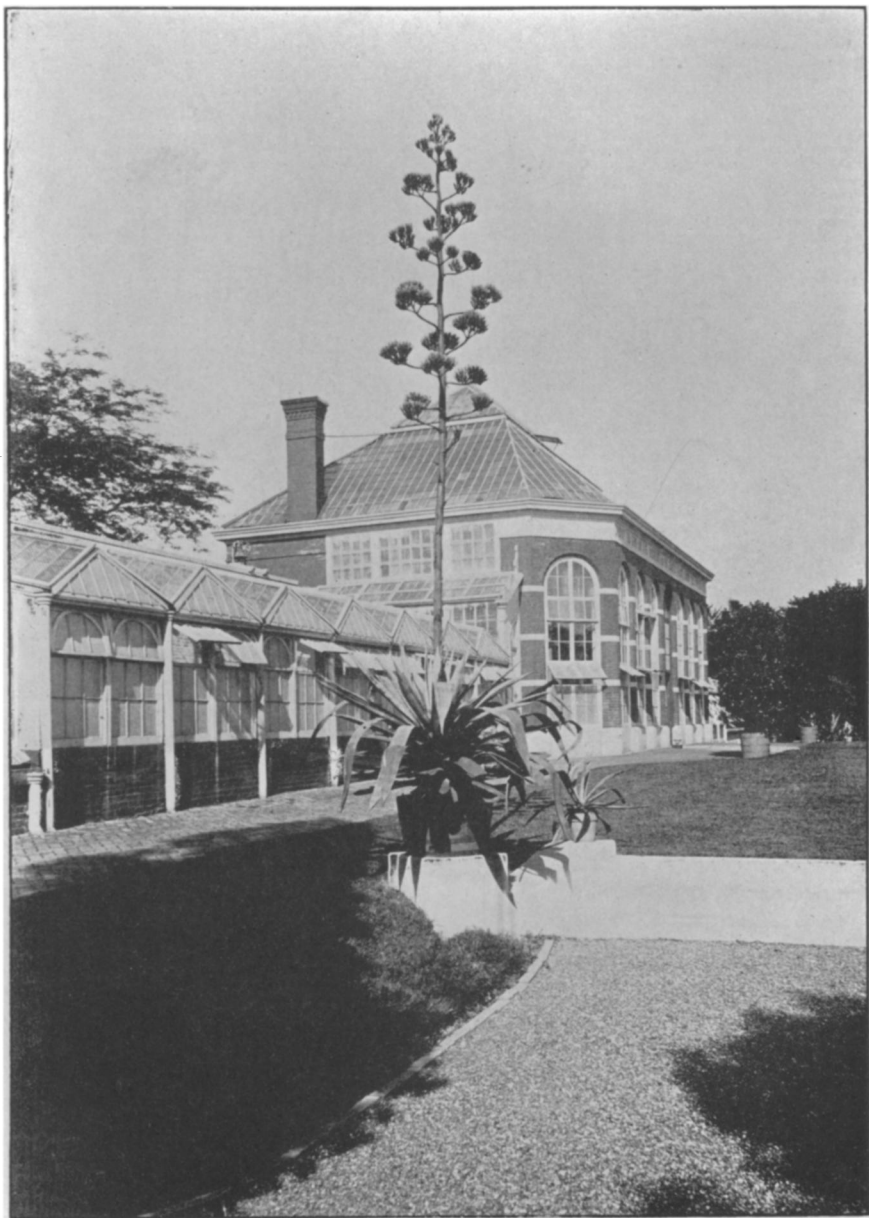
The following report on the Missouri Botanical Garden and the Henry Shaw School of Botany is respectfully submitted, in compliance with the rules of the Board.

THE BOTANICAL GARDEN.

So far as we have means of ascertaining, the number of visitors to the Garden during the past year was a little greater than in 1892. On the open Sunday in June, 14,250 persons visited the grounds, notwithstanding the occurrence of frequent showers during the afternoon, and on the open Sunday in September, which was a pleasant day, 14,400 persons passed the gate. So far as could be learned, the visitors noticed and appreciated the improvements which have been made since last year.

The greater part of the western side of the grounds has this year been put in grass, as was done last year on the eastern side, and the borders, which are arranged in circles about the observatory in the center of the Garden, have been also covered with turf. Notwithstanding the large amount of cultivated ground thus converted into lawn, the number of decorative plants used for bedding has been increased, and the distribution of color through the grounds has not been restricted, for in the parts of the Garden referred to, these plants are now gathered in small natural groups, the effect of which is heightened by their setting of regularly mown grass. This change has been commented on favorably by many visitors.

Owing to the death of many of the shrubs composing the hedges of the labyrinth in the southern end of the



AGAVE MEXICANA, BY THE MAIN GREENHOUSE.

arboretum, and the impossibility of replacing those that had died, or of entirely renewing the hedges without removing a fine weeping ash and several well grown hemlock trees which stood in the maze, it was decided by the Board, in 1892, that the labyrinth should be taken out. In the early part of 1893, therefore, the labyrinth was removed, a portion of the ground was graded and seeded to blue grass, and the remainder was covered by a piece of natural rock work, constructed of the porous limestone of the Meramec river. Through the open season, this rockery is occupied by the large collection of cacti and agaves, forming a naturally arranged Mexican garden. A small rockery for the growth of alpines has also been formed under one of the shelter houses by the Linnean House, and a sinuous lily pond has been made about the old summer house at the extreme western part of the arboretum. The wild garden in the southern part of the arboretum has been maintained about as in the preceding year, though an effort is being made to confine the small beds in it to one, or at most a few, species each.

During the year some 1,490 packets of seed have been received by exchange or donation from other institutions, including 200 bulbs from the Cape of Good Hope, and about 2,220 packets have been distributed. Several fine plants have been obtained by purchase, notably a large specimen of *Encephalartos horrida*, an old *Cycas revoluta*, and a fine tree of *Dicksonia Chamissoa*, one of the ferns. Donations of specimen plants have been made to the Garden by the Michel Plant and Bulb Company, Mr. D. S. Brown, Mr. C. R. Orcutt, and Mr. Fred Kanst, of South Park, Chicago. The Garden also has the promise of a large number of plants which were used about the French building and elsewhere on the Exposition grounds in Chicago, which we expect to receive early in the spring. The plants loaned by the Garden for the Missouri exhibit in Chicago have been largely donated to the University of Missouri and the Chicago parks, by direction of the Board.



CEREUS PERUVIANUS, IN THE ROCKERY.

As was done last year, about 1,000 of the best of the plants which could be saved when the beds were cleared after the first autumn frosts, were distributed in the tenement region of the city through the interest of the managers of the Bethel.

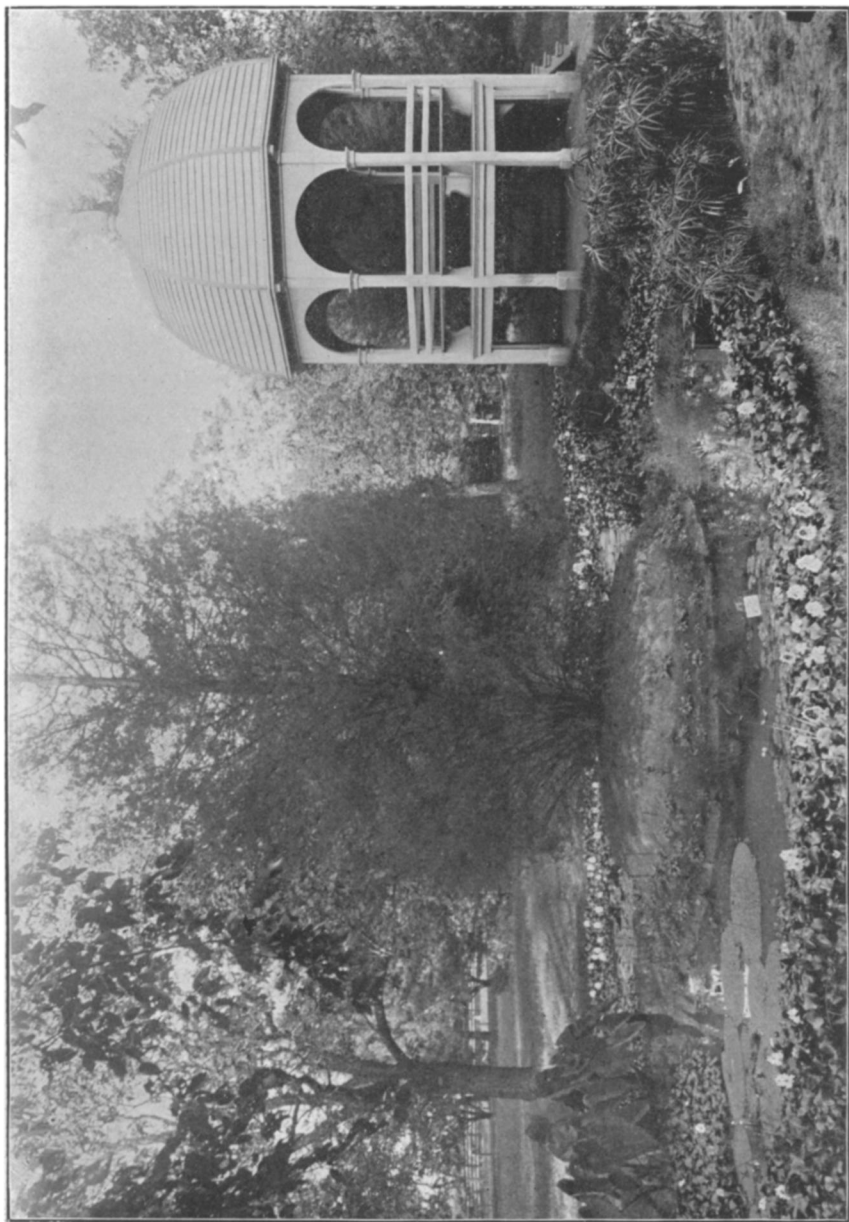
In the summer a small, cheaply built plant house was constructed at the rear of the main greenhouse, making it possible, for the first time, to bring a considerable number of plants into bloom in the winter, so that during the present winter more color than usual is being introduced into the main greenhouse. The comfort of visitors has been increased by the introduction of water closets at the main gate, in place of the very unsatisfactory vaults previously in use there; and the nuisance occasioned by the smoke from the greenhouses has been largely removed by the employment of coke in place of soft coal for all houses except those heated by flues, where, as heretofore, wood is used because of its special adaptation to this primitive manner of heating. A considerable number of additional metallic labels have been affixed to trees in various parts of the grounds, and the labeling of herbaceous plants has been much more satisfactory than ever before, although there still remains room for improvement with these.

The average number of gardeners and laborers employed has been 40, and the labor pay-roll for the year amounts to \$15,537.70. The minor improvements made during the year have been reported to the Board in detail, from month to month but they may be summarized as follows: 240 running feet of drain tile was laid; 18,000 square feet of ground has been sodded, and 224,200 square feet prepared and seeded to blue grass (including about 9,000 square feet about the lodge); 3,500 square feet of good cinder walk was made in the vegetable garden, and 6,800 square feet of less durable cinder walk in the arboretum, in addition to regraveling the greater part of the walks in the garden proper, as a consequence of a severe rain storm

in July; and a small summer house was reconstructed in the grounds at the rear of the herbarium building.

In the early part of July, the garden was visited by an unusually severe hail and rain storm, four inches of water falling in about an hour and a half, — most of it within half an hour. Though the hail entirely destroyed the foliage of the larger leaved plants, no glass was broken. The most severe damage was done to the walks, for, notwithstanding the abundant drains and silt pits of the main garden, the water collected to a depth of about three feet in the extreme northern end of the garden, where it was held by the stone and brick walls, backing up from there nearly to the gate, and completely filling the sunken parterre. The rushing of this volume of water over the walks quite denuded them of gravel, but the foundations laid some three years ago were not injured, and within a few days the walks were in nearly as good condition as before the storm, though it has been found impossible to secure as compact binding of the gravel as at first.

The droughts and extreme alternations of winter temperature each year since I have been in charge of the garden have told not only on the lawns, on which it has been necessary to expend much labor each year, but also on the woody plants, especially the evergreens. The Norway spruce, in particular, has suffered from these causes, and it will be but a few years before all of the older trees of this species have disappeared from the Garden. The old red cedars arranged along the walks of the garden proper, which for many years have been a striking feature of the Garden, are also succumbing, and it has been found necessary to remove many of them during the past two years, and also a considerable number of arbor vitae. I observe from the last report of the Director of the Botanic Garden of Harvard University that the same loss of evergreens has been experienced there, from the same causes. While it is a matter of regret to lose any well grown tree, the garden and arboretum have been overcrowded because



LILY POND, IN THE ARBORETUM.

of too close planting in the first instance, so that except where trees have grown so as to mutually injure one another, the removal of those which die is in the main beneficial, and new trees are being planted where it is desirable to replace those which have been lost.

The additions to the herbarium during the year have consisted mainly of current American collections. A part of the specimens reported a year since as received have also been mounted and distributed. The number of sheets incorporated in the herbarium in 1893, and not previously reported, is 19,417, of which 9,304 were purchased, 3,618 were derived from the Bernhardt herbarium, not previously distributed, and 6,495 received by donation or exchange, or collected in or about the Garden. Of this latter number, 1,260 specimens were contributed by Mr. B. F. Bush, who collected largely in the more poorly explored portions of the state, adding much to our knowledge of its botany. The principal donors of the year have been the Botanical Garden of Copenhagen, Professor Miyabe, of Sapporo, Japan, Captain J. Donnell Smith, of Baltimore, Professor C. S. Sargent, of the Arnold Arboretum, Mr. C. G. Lloyd, of Cincinnati, Dr. J. Schneck, of Mt. Carmel, Illinois, the California Academy of Sciences, and Mr. J. Q. A. Fritchey, of this city. The herbarium as now arranged consists of the following collections: —

The Engelmann herbarium (all groups).....	98,000	specimens.
The general herbarium of higher plants:		
The Bernhardt herbarium.....	61,120	
Other specimens.....	46,880	
	<hr/>	
	108,000	“
The collection of Thallophytes.....	16,420	“
	<hr/>	
Making a total of about.....	222,420	specimens.

In addition to these herbarium specimens proper, the Garden possesses a set of wood wedges illustrating the forestry report prepared by Professor Sargent as one of

the volumes pertaining to the census of 1880, and forming a portion of the material received some years ago with the Engelmann herbarium, and 1,719 thin veneers of woods, mounted as transparencies, and comprising 541 sections from the logs of the well-known Jesup Collection of Central Park, New York, 78 sections of the set of Hough's American Woods, and 1,100 sections, comprising the entire set thus far issued, of Professor Nördlinger's Holzquerschnitte.

During the year, 1,320 volumes and 1,344 pamphlets have been purchased, the expenditure for the year for purchases, subscriptions and binding being \$3,389.47; and 284 volumes, valued at \$439.20, and 983 pamphlets, valued at \$169.85, have been received by donation or exchange. In the summer, the prelinnean library donated by Dr. E. Lewis Sturtevant, of South Framingham, Massachusetts,* consisting of 463 volumes, many of them containing several treatises, and accompanied by a number of volumes and pamphlets pertaining to more recent botany, was received at the Garden, and has been arranged. The catalogue of this collection, for publication in the Garden Report, has been carried nearly to completion, but this publication will be deferred for the sixth Garden Report; and as yet no valuation has been placed on the books, so that they have not been added to the capital stock account. Exclusive of the Sturtevant gift, the library at present contains:—

Books.....	6,829
Pamphlets.....	8,657
<hr/>	
Together.....	15,486 works, valued at.....\$25,268 52

An indexer has been kept steadily employed during the greater part of the past year on the card index of illustrations in the Garden library, and some 20,000 unpublished

* See Report for 1892, page 14.

sketches and manuscript notes of the late Dr. George Engelmann have been mounted on sheets and bound in 60 quarto volumes, not included in the preceding enumeration.

The Garden room at the Marine Biological Laboratory at Wood's Holl was again used through the summer of 1893 by Mr. M. A. Brannon, who continued his studies of *Grinnellia*, and it is expected that he will make similar use of it through the coming season,—my feeling being that it is better to have one piece of work completed in this way than to have several begun and left unfinished for lack of the facilities which the Garden can give.

So much of my time as could be spared from administrative and class work has been devoted to botanical study, and two small papers on systematic botany will appear in the fifth Report, while another is nearly ready for advance publication from the sixth volume. My general assistant, Mr. J. G. Smith, who succeeded Mr. Dewart in June last, has found time, in addition to his routine duties, to nearly complete a revision of the North American species of *Sagittaria*, which is expected to be ready for publication early in the year.

In addition to the regular publications for the year, the Garden has issued a second edition from the electrotyped plates of the first Report, the supply of which had become exhausted; and a small handbook giving in a concise form the principal facts about the Garden, and illustrated by a map and a number of half-tone illustrations of points of interest to visitors, has been published and placed on sale at the gate, at the nominal price of 25 cents per copy.

Four annual events provided for in the will of Henry Shaw have taken place during the year, namely: the delivery of the fourth annual flower sermon, on the 14th of May, in Christ Church Cathedral, by Rt. Rev. Thomas U. Dudley, Bishop of Kentucky; the fourth banquet of the Trustees of the Garden and their guests, presided over by Judge G. A. Madill, of the Board; the award of the third series of Shaw premiums at a floral exhibition, given under the

management of the Florists' Club of St. Louis; and the fourth banquet to florists, gardeners, and nurserymen.

The flower sermon will be printed in the fifth Report of the Garden, which will also include an abstract of the proceedings at the Trustees' banquet. The annual convention of the Society of American Florists in St. Louis in August last brought so many representative florists together that an invitation to visit the garden in a body was extended to them, which was accepted by about 300 delegates, on the tenth of August, on which occasion, by direction of the Board, an open-air collation was served, in lieu of the gardeners' banquet heretofore given in the autumn. In addition to the members of the Society, several distinguished European horticulturists were present, among them Mr. E. H. Krelage, of Haarlem, M. Jules Lemoine, Superintendent of the parks of Paris; Mr. George Nicholson, Curator of the Royal Gardens at Kew, England; Mr. Ludwig Schiller, in charge of the German gardening exhibits in Chicago; and Professor L. Wittmack, of Berlin, editor of the most important horticultural journal of Germany. The Director of the Garden and his assistants, the Head Gardener and foremen and their principal assistants, and the pupils holding garden scholarships, were also present. Owing to the informal character of the gathering, no speeches were made, but the guests were shown over the grounds by the garden staff, and made to feel at home in the Garden.

The Shaw premiums were offered last year for the same class of plants as in 1891 and 1892,* the amount awarded being \$400.00. After consultation with the officers of the Florists' Club, the sum of \$100.00 was reserved from the amount set aside for annual premiums, to cover the expense of preparing dies for a gold medal of the value of \$25.00; and at its June meeting, the Board of Trustees of the Garden founded such a medal, "to be known as the Henry

* Third Report, page 18; fourth Report, page 19.



CHRYSANTHEMUM MAJOR BONNAFFON.

Shaw Medal for the introduction of a valuable plant, and to be awarded each year, when practicable, for a new plant of value for cultivation, exhibited in St. Louis, as a part of the premiums or prizes to a flower show or exhibition provided for in the will of the late Henry Shaw; provided that the judges or other persons making awards at such exhibition shall certify that *said medal is awarded for a plant of decided merit for cultivation, not previously an article of North American commerce, and introduced to such commerce by the exhibitor during the year in which said award is made.*''

In accordance with a previous understanding, the Florists' Club this year offered this medal for a seedling chrysanthemum, and it was awarded to J. Dorner & Son, of Lafayette, Ind., for the chrysanthemum Major Bonnaffon; but it is intended that in future the medal may be competed for in any line of decorative horticulture.

In March last, the vacancy among the garden pupils mentioned in my fourth report * was filled in accordance with an announcement issued in November preceding. One of the pupils appointed in 1890 will have completed his course in April next, and an announcement has been issued, stating that the vacancy so arising will be filled then, in accordance with rules of the Board.

As in previous years, a number of botanists have visited the Garden and made use of its facilities for investigation, and various courtesies have been extended by the Garden to other similar institutions and received from such institutions, to the officers of which my thanks are tendered.

THE SCHOOL OF BOTANY.

Until the end of the last college year, Mr. Jared G. Smith acted as assistant and University Instructor in the School of Botany, resigning that position in June to be-

* Report for 1892, page 17.

come my botanical assistant at the Garden. Since the beginning of the present college year, I have been assisted at the School by Mr. Charles H. Thompson, who came to the School from the Kansas Agricultural College. During the college year 1892-3, three special students met at the Garden for systematic work, and two special students were provided for at the laboratory through the year, and two others during a part of the year. One advanced student from a distance spent the summer at the Garden in a study of economic mycology. In the spring term, a class of eight teachers was occupied at the laboratory of the School with a study of native flowers, under the charge of Mr. Smith; and through the same term I conducted a class of fifteen teachers at the Garden, for a study of trees. A class of twenty-five children was also taught at the Garden by Mrs. F. W. Wislizenus, through the spring. Throughout the year the undergraduate classes of the University were taught by myself and Mr. Smith, the laboratory work being left largely in his hands.

In the first paragraph of the second clause of Henry Shaw's will, certain property is bequeathed to Washington University, "the income of which is to be used solely for the maintenance of a School of Botany; said income to be used exclusively to pay the salaries, and to defray the necessary incidental expenses of those engaged in botanical instruction, and researches at the Garden, and as need may require also within the precincts of the University; also for the maintenance of the requisite botanical laboratories, and their equipment with instruments and appliances for illustration and investigation, for the maintenance and increase of a botanical library and herbarium; and for such like objects strictly german to a School of Botany." * To secure harmonious co-operation of the School with the Garden, Mr. Shaw, in the second paragraph of the same clause, requires that the professor and teachers in the

* Garden Report for 1890, page 36.

School of Botany shall be appointed from the Garden staff, or on the nomination or with the approval of the Trustees of the Garden; and to prevent the School from suffering from too great depreciation of its endowment, it is provided that whenever the net income of the School shall fall below \$3,500, the Board of Trustees shall pay over to the University such sum as may be required to make the annual income \$3,500.

When the School of Botany was opened, in 1885, its income was something over \$5,000 per year,* but subsequently the revenue property was vacant and it was found impossible to again so rent it as to secure even the minimum of \$3,500 specified by Mr. Shaw.† Question having been raised as to the authority of the Garden Board to make good the deficit in the manner indicated in the will of Mr. Shaw, because of his having transferred to Washington University during his life-time, the endowment property mentioned in the will, but for the purposes therein specified,‡ the instruction of the courts was asked, and on the twentieth of February last, an opinion was handed down by Judge Valliant, of the Circuit Court, authorizing the Board to make good such deficit in the future, and embodying a decree covering the amount of the deficit up to that date. This opinion, therefore, insures the maintenance of the School of Botany on the basis contemplated and intended by Mr. Shaw.

As a result of a conference between the managing boards of the University and the Garden, a readjustment was made of the proportion of the Director's salary paid respectively by the Garden, and by the University for services as head of the School of Botany, which liberates a considerable sum each year, previously paid on that salary, but now set free for other uses of the School. During the present year the surplus will be largely spent in secur-

* First Report, page 60.

† Second Report, page 19.

‡ First Report, page 61.

ing needed additions to the instrumental equipment and library of the School, in preparing for the series of eleven undergraduate electives now offered by the University; but it is expected that an additional instructor, probably a specialist in lower cryptogamic botany, will be engaged at an early date. The adoption of a liberal elective course in the undergraduate department of the University gives promise that botanical work of value may now be done with students in regular attendance on the University. As these courses involve the expenditure of more of the time of instructors than it has heretofore been possible to utilize with undergraduates, the announcement in the University catalogue of special classes such as have been indicated in my former reports,* and mentioned above as having been conducted during 1892-3, has been discontinued by direction of the Advisory Committee of the School of Botany.

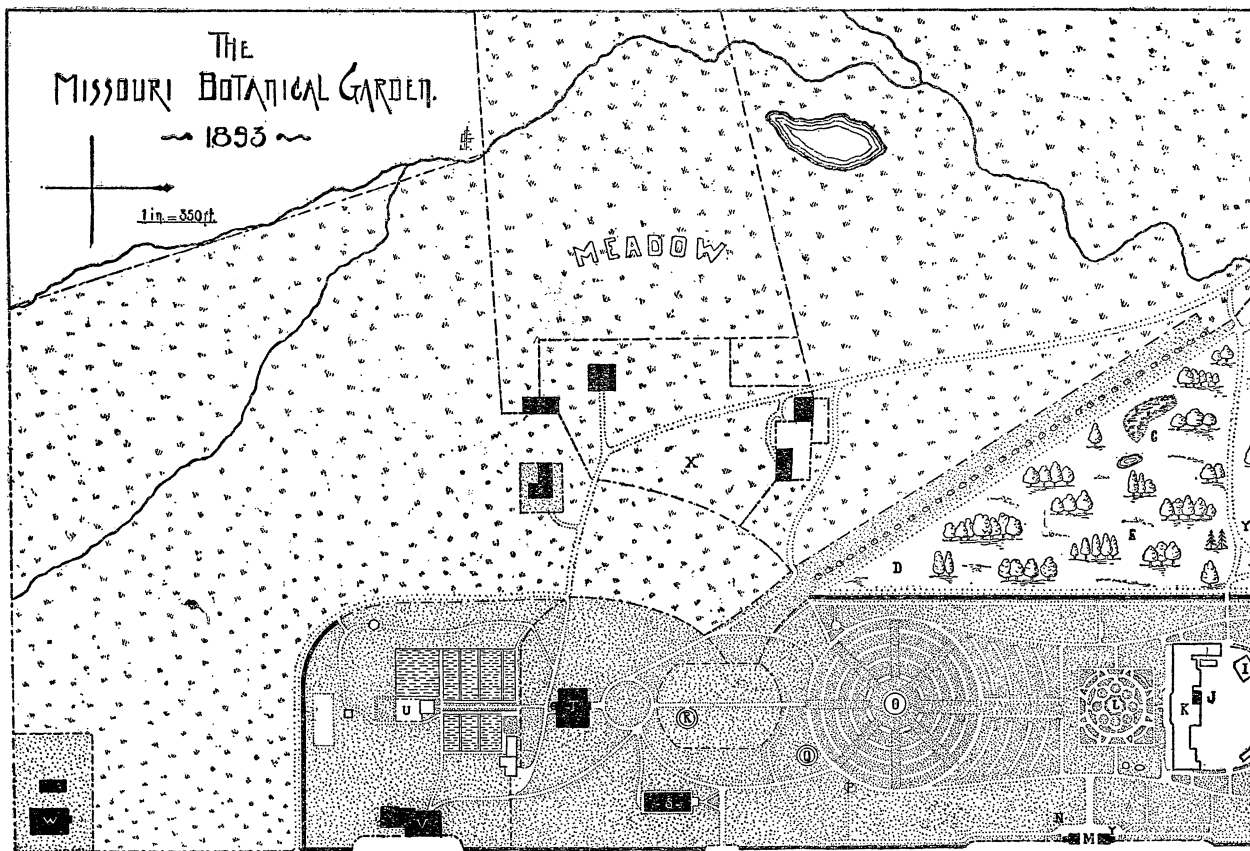
In closing this report, I wish to express my appreciation of the courtesy and interest of the Board, as manifested through the year, and of the faithful service rendered by my assistants, both in the School of Botany and at the Garden.

Very respectfully,

WILLIAM TRELEASE,
Director.

January 10, 1894.

* Garden Reports, i, pages 84-86, and 100; ii, page 32; iii, page 19; iv, page 20.



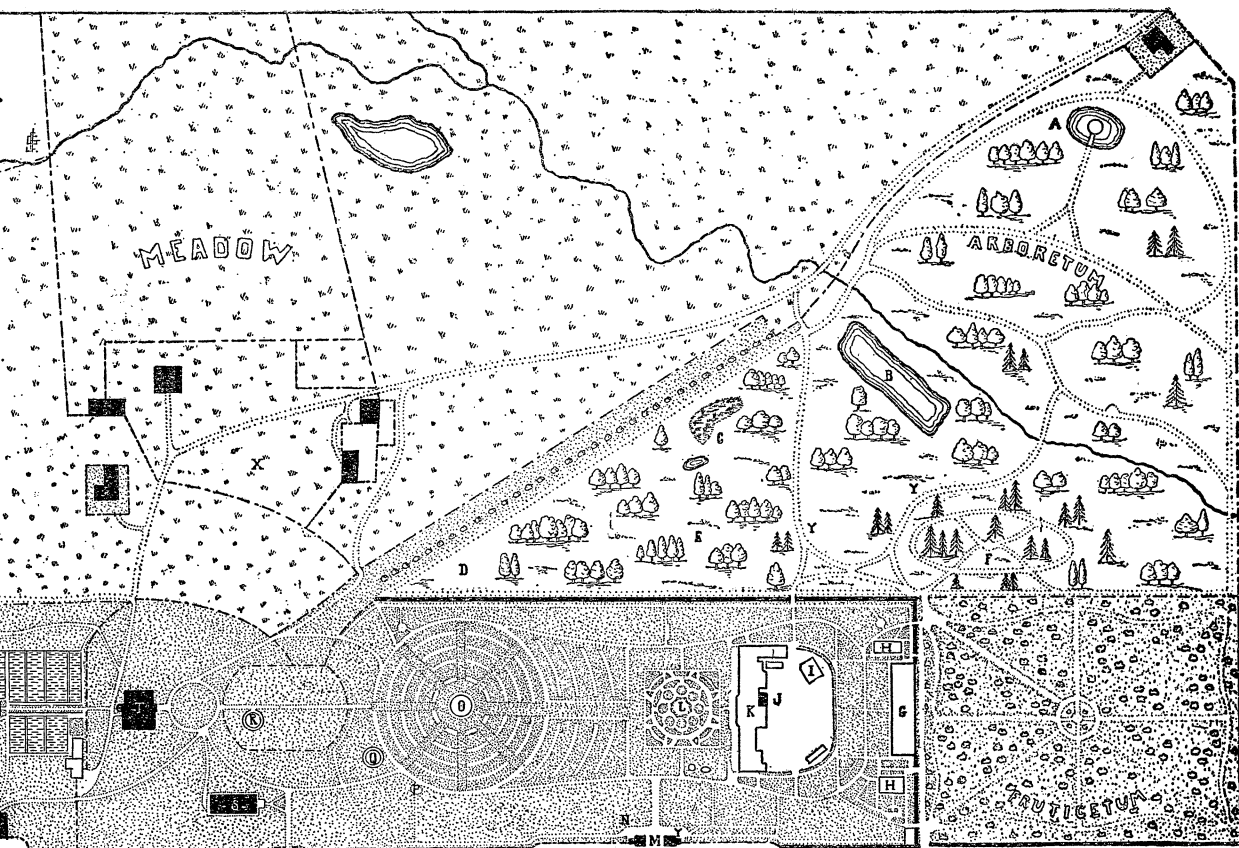
(The bottom of the map faces on Tower Grove Avenue, Shaw Avenue is at the right and Magnolia Avenue

A. LILY POND.
B. WILLOW POND.
C. BOG.
D. CACTUS ROCKERY.
E. WILD GARDEN.

F. CONIFERS.
G. LINNEAN HOUSE.
H. SMALL ROCKERIES.
I. WARM HOUSE.
J. HEAD GARDENER'S OFFICE.

K. MAIN GREENHOUSE.
L. PARTERRE AND STATUE.
M. MAIN GATE.
N. DRINKING FOUNTAIN.
O. OBSERVATORY.

P. DRINKING WATER.
Q. STATUE.
R. MAUSOLEUM.
S. MUSEUM.
T. RESIDENCE.



of the map faces on Tower Grove Avenue, Shaw Avenue is at the right and Magnolia Avenue is at the left.)

UNIFERS.
 NNEAN HOUSE.
 ALL ROCKERIES.
 ARM HOUSE.
 AD GARDENER'S OFFICE.

K. MAIN GREENHOUSE.
 L. PARTERRE AND STATUE.
 M. MAIN GATE.
 N. DRINKING FOUNTAIN.
 O. OBSERVATORY.

P. DRINKING WATER.
 Q. STATUE.
 R. MAUSOLEUM.
 S. MUSEUM.
 T. RESIDENCE.

U. VEGETABLE GARDEN.
 V. HERBARIUM AND OFFICE.
 W. LODGE.
 X. FARM BUILDINGS.
 Y. TOILET.